

## Volcanic Hazards: Flow

### Think About It

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- How do volcanoes affect living things?



# WHAT DO YOU THINK?

## Activity 3

### Investigate Part A

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1. What is the relationship between the volume of an eruption and the size of the area it covers?

3. Make a data table

Volume	Surface Area (cm <sup>2</sup> )
0.5 cm <sup>3</sup>	
1 cm <sup>3</sup>	
2 cm <sup>3</sup>	
4 cm <sup>3</sup>	
8 cm <sup>3</sup>	
16 cm <sup>3</sup>	

8a. What effect does temperature have on resistance to flow (viscosity)?

8b. What happens to fluid when slope changes from steep to gentle?

8c. What effects would you see if fluids moved through narrow channels?

## Activity 3

### Investigate Part B

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2a. Convert the travel times into minutes.

Expected Travel Times for Lahars Triggered by a Large Eruption of Mt. St. Helens (USGS)		
Distance (via river channels) from Mt. St. Helens (km)	Estimated travel time (minutes)	
	North Fork Toutle River	South Fork Toutle River, Pine Creek, Muddy River, Kalama River
10		
20		
30		
40		
50		
60		
70		
80		
90		
100		

3a. Make a graph of travel time for both forks of the river.

4a. Which area (North Fork or South Fork) is more likely to have a steeper slope? Explain.

## Activity 3

### Volcanic Hazards: Flow

#### Digging Deeper

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**Learning Objective:** In writing, SWBAT describe the factors that affect the speed of lava flow using academic language.

#### **Lava flow**

a river of lava from a volcano or opening in Earth's surface



Speed of  
lava flow

is affected by:

1. amount of silica
2. temperature
3. slope

Amount of silica	more silica → slower flow less silica → faster flow
Temperature	higher temperature → faster flow lower temperature → slower flow
Slope	steeper slope → faster flow gentle slope → slower flow
<b><u>Viscosity</u></b>	describes how easily lava flows
Low-silica lava	is less viscous, so it is thinner and flows more easily and quickly



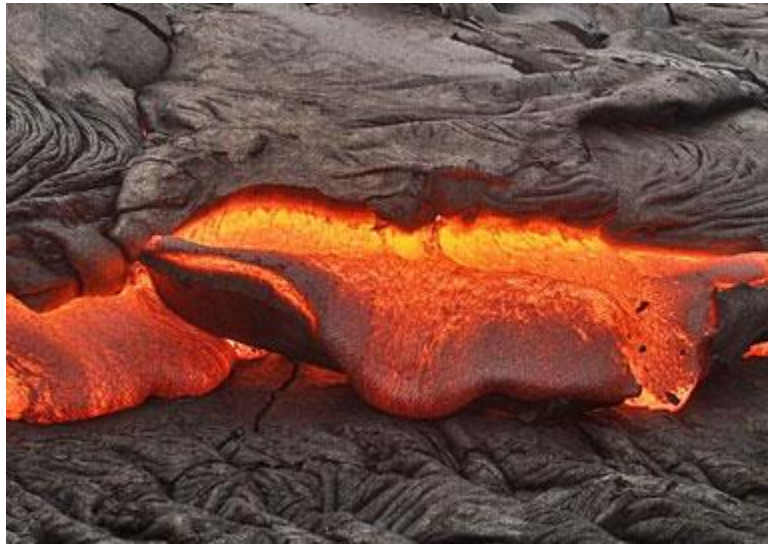
<https://www.youtube.com/watch?v=OWcO3LDIIGE>

<https://www.youtube.com/watch?v=6J6X9PsAR5w>

<http://www.volcanovideo.com/Movies/FlowingLava.mov>

<https://www.youtube.com/watch?v=3tUkKYdQj7o>

High-silica lava is more viscous, so it is thicker and flows very slowly



<http://www.volcanovideo.com/Movies/LavaAaflow.mov>

<https://www.youtube.com/watch?v=iyIV5fd1Aww>

Amount of Silica	Flow/Viscosity	Gases	Type of Eruption
Low	Low viscosity— thinner, flows quickly, easily and far	Few gases, escape easily	Quiet, lava pours down the sides
High	High viscosity— thicker, flows slowly	Large amounts of gases, trapped under pressure	Violent, explosive



**Learning Objective:** In writing, SWBAT describe a pyroclastic flow and lahar, using academic language, in order to understand the hazards caused by volcanic eruptions.

### **Pyroclastic flow**

a cloudy mixture of hot ash, hot gases and rock pieces formed by a volcanic explosion



Pyroclastic flows are extremely dangerous; they destroy everything in their path

<https://www.youtube.com/watch?v=Cvjw9nnwXY>

<http://dsc.discovery.com/videos/ultimate-guide-to-volcanoes-pyroclastic-flow.html>

**Lahar**

a river of water, mud, and volcanic rock pieces that flows down the sides of a volcano





## How lahars form

heat from the volcanic eruption melts snow and ice, which runs down the sides of the volcano

The melted snow and ice mixes with ash, volcanic rocks and other material

The mixture flows quickly and with great force to the valleys below the volcano

When a lahar finally comes to a stop, it can bury an entire village under many meters of mud





<http://www.youtube.com/watch?v=j5LB8okigjA&feature=fvst>

<http://www.youtube.com/watch?v=5x5tZAHEoRU>

<https://www.youtube.com/watch?v=WEAfXO7q8Xs>

<https://www.youtube.com/watch?v=7Ct7G5lEHpc>

## Activity 3

### Check Your Understanding

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1. Name three factors that affect the speed of a lava flow.

2. What is a pyroclastic flow?

3. What is a lahar?

4. How are lahars formed?

5. Explain how slope affects the speed of a lava flow.